EXHIBIT C

Page 1

UNITED STATES DISTRICT COURT

DISTRICT OF MASSACHUSETTS

* * * * * * * * * * * * * * * * *

                                  *

SINGULAR COMPUTING, LLC.,   *

                                  * No. C.A. No:

          Plaintiff,   * 1:19-cv-12551-FDS

                                  *

     vs.   *

                                  *

GOOGLE, LLC.,   *

                                  *

          Defendant.   *

                                  *

* * * * * * * * * * * * * * * * *

VIDEOCONFERENCE DEPOSITION OF MIRIAM LEESER, Ph.D.,

Deposition taken with all parties appearing remotely,

on Wednesday, March 8, 2023, commencing at 10:59 a.m.

Court Reporter:

Pamela J. Carle, LCR, RPR, CRR

Page 2

```
 1                    APPEARANCES
 2
     For the Plaintiff:
 3
         PRINCE LOBEL TYE
 4       One International Place, Suite 3700
         Boston, Massachusetts 02110
 5       By:  Brian Seeve, Esq.
              Matthias Kamber, Esq.
 6            Cameron Panepinto, Esq.
              Daniel J. McGonagle, Esq.
 7            Matthew Vella, Esq.
              617.456.8000
 8            bseeve@princelobel.com
 9
     For the Defendants:
10
         KEKER VAN NEST & PETERS
11       633 Battery Street
         San Francisco, California 94111
12       By:  Vishesh Narayen, Esq.
              415.773.6635
13            vnarayen@keker.com
14
     Also present:
15
         Brianna Diaz
16       Anant Saraswat
         Nathan Speed
17
18
19
20
21
22
23
```

Page 3

Page 4

```
 1      MIRIAM LEESER, Ph.D.,
 2      having been duly sworn,
 3      was deposed and testified
 4      as follows:
 5      EXAMINATION
 6  BY MR. SEEVE:
 7      Q.    So good morning, Doctor Leeser.  My
 8  name is Brian Seeve; it's nice to meet you
 9  remotely.  I'm going to ask you questions at this
10  deposition, and I don't know if you've been
11  deposed before.  Have you?
12      A.    No, I have not.
13      Q.    Okay.  So I'll go through some of the
14  ground rules, and then we'll begin with the formal
15  testimony.
16          So the general idea is that I ask you
17  questions, and your attorney, Vishesh, has the
18  opportunity to object by saying objection, and
19  then you, unless instructed otherwise by your
20  attorney, answer those questions.  Do you
21  understand?
22      A.    Yes.
23      Q.    Now, this deposition is being
24  videotaped, and you understand that as well,
25  correct?
```

MIRIAM LEESER PHD
SINGULAR COMPUTING vs GOOGLE

March 08, 2023
13–16

Page 13

1   Q.   Can you describe in your own words what
2   VFLOAT is?
3   MR. NARAYEN: Objection, vague.
4   A.   Can you be more specific?
5 BY MR. SEEVE:
6   Q.   I mean, I'm asking you to describe in
7   your own words what one of your own projects is.
8   I can't really be more specific. What is VFLOAT,
9   I guess is the question.
10   MR. NARAYEN: Objection, vague.
11   A.   So VFLOAT is a research project I was
12   involved in, as were several of my students, where
13   we looked at variable precisions floating point
14   operations, and particularly mapping them to FPGAs.
15 BY MR. SEEVE:
16   Q.   VFLOAT is a library of VHDL modules, is
17   that right?
18   A.   So there's the VFLOAT project. Part of
19   that project we made a library of VHDL modules
20   available. So that is part of the VFLOAT project,
21   yes.
22   Q.   What is the rest of the VFLOAT project?
23   MR. NARAYEN: Objection, vague.
24   A.   So we use those modules for various
25   different applications.

Page 14

1 BY MR. SEEVE:
2   Q.   So -- I'm sorry.
3   A.   So there's the VFLOAT library, which
4   specifically use those VHDL modules that you talk
5   about, and then there are applications that we take
6   using the VFLOAT library as well.
7   Q.   So is it correct to characterize the
8   VFLOAT library as a tool that can be used to
9   design circuits that can then be implemented on an
10   FPGA?
11   A.   The VFLOAT library is a set of modules
12   that can be used to design circuits that are
13   implemented on an FPGA.
14   Q.   And you're referring to the VFLOAT
15   project as a whole as comprising not only that
16   library, but also the work that you've done using
17   that library to implement various circuits on
18   various FPGAs, is that correct?
19   A.   That's correct.
20   Q.   Okay. Now, the VFLOAT library is
21   software, is that right?
22   A.   It's a collection of VHDL modules, so
23   VHDL is a hardware description language, so -- but
24   that is code that is designed to map on to
25   hardware.

Page 15

1   Q.   So HDL stands for hardware description
2   language, correct?
3   A.   Correct.
4   Q.   And VHDL is a particular hardware
5   description language, correct?
6   A.   Correct.
7   Q.   And the VFLOAT library is a collection
8   of VHDL files that represent modules for
9   performing arithmetic, right?
10   A.   So the VFLOAT library is a set of
11   modules including modules that perform arithmetic.
12   Q.   It's specifically a set of files that
13   specify modules for performing arithmetic, right?
14   A.   For performing arithmetic and auxiliary
15   functions.
16   Q.   Okay.
17   A.   It's --
18   Q.   Understood. I'm just drawing a
19   distinction here between modules themselves, which
20   are circuits that are hardware, and the VFLOAT
21   library modules, which are actually computer files
22   which can be used to create hardware. That's a
23   fair characterization, correct?
24   MR. NARAYEN: Objection,
25   mischaracterizes the witness' testimony.

Page 16

1   A.   So you're asking about a distinction
2   between software modules and hardware modules, and
3   I never made that distinction.
4 BY MR. SEEVE:
5   Q.   Well, I'm not saying you made the
6   distinction before. I'm just saying there is a
7   thing -- a hardware module is a physical, tangible
8   thing that exists on an integrated circuit or an
9   FPGA, and it's a circuit. And a VHDL file, for
10   example, one in the VFLOAT library that defines a
11   module, that is not a circuit, that is a computer
12   file, is that correct?
13   MR. NARAYEN: Objection,
14   mischaracterizes the witness' testimony.
15   A.   So the VHDL description are software
16   files that describe components -- or, sorry,
17   modules -- that get mapped on to FPGA hardware. So
18   F -- I still -- I still don't understand your
19   definition of a hardware module. Like an FPGA,
20   it's programmable hardware. So it's not -- the
21   hardware module itself isn't a base entity.
22 BY MR. SEEVE:
23   Q.   Okay. So I, for example, downloaded
24   the VFLOAT library from your website, for example,
25   and I have a directory of VHDL files, and those

Page 41

1 mischaracterizes the witness' prior testimony,
2 asked and answered, argumentative.
3   A.   There are particular circuits designed
4 with the VFLOAT library and downloaded on to the
5 FPGA design and anticipate the claims, and the
6 details are laid out in the report.
7 BY MR. SEEVE:
8   Q.   Okay. Is one of those circuits the
9 design we talked about, the 61 C2 multipliers?
10   A.   So I discuss in the report how the
11 design with 61 C2 multiplier anticipates some
12 claims. Like I said, I lay that out in the report.
13   Q.   There are two claims at issue in this
14 case. You know that, right, Doctor Leeser?
15   A.   That's correct.
16   Q.   And do you believe that the 61 C2
17 multiplier circuit as implemented by you and Pavle
18 Belanovic anticipates both of those claims?
19   A.   Can you explain to me what those two
20 claims are precisely?
21   Q.   Certainly. So are you aware -- let's
22 mark the patents in suit as exhibits.
23   Rather than doing that, are you aware
24 that this is a patent case involving a claim of
25 patent infringement, Doctor Leeser?

Page 42

1   A.   Yes, I am.
2   Q.   And you are aware of what claims have
3 been asserted against Google in this case, right?
4   A.   So in my report I lay out my response
5 to the claims -- of the asserted claims in section
6 7. So those are the claims that my report
7 addresses.
8   Q.   Okay. That's not quite what I asked.
9 I'm sorry, that's not quite what I asked,
10 Doctor Leeser. I'm just asking if you're aware of
11 what patents have been asserted in this lawsuit,
12 and what particular claims of those patents are at
13 issue in this lawsuit, correct?
14   MR. NARAYEN: Objection, vague. Lacks
15 foundation.
16   A.   So I'm aware that this is a patent
17 lawsuit. I'm aware there are two patents that
18 we're looking at, and two claims which have other
19 claims associated with them, and that's laid out in
20 section 7 of my report. Those are the two claims
21 that I understand that we're talking about.
22 BY MR. SEEVE:
23   Q.   Understood. Now, and you've also
24 explained that in order to anticipate a patent
25 claim, you understand that a particular device has

Page 43

1 to satisfy every limitation of that claim,
2 correct?
3   MR. NARAYEN: Objection, asked and
4 answered, calls for a legal conclusion.
5   A.   I stand by my prior testimony.
6 BY MR. SEEVE:
7   Q.   Again, that's -- that's not an answer.
8 Let me ask the question again. Let me ask the
9 question again once I log on to the realtime feed,
10 if I can.
11   MR. NARAYEN: Counsel, if you wouldn't
12 mind refraining from the colloquy and just stick
13 to questions of Doctor Leeser.
14   MR. SEEVE: Sure. I just wanted to
15 explain why I'm not asking a question right now,
16 because I'm logging on to the realtime feed.
17   MR. NARAYEN: No, the editorializing I
18 was referring to saying that that's not an answer.
19 If you could just stick to questions of
20 Doctor Leeser, we would appreciate that.
21 BY MR. SEEVE:
22   Q.   Doctor Leeser, the question that I
23 asked is you've explained -- let me start again.
24 You understand that in order to anticipate a
25 claim, a particular device has to satisfy every

Page 44

1 limitation of that claim, correct?
2   MR. NARAYEN: Objection, asked and
3 answered, calls for a legal conclusion.
4   A.   Yeah, I'm not going to answer that
5 question.
6 BY MR. SEEVE:
7   Q.   So you're refusing to answer the
8 question, is that correct? I just want to make
9 sure I understand.
10   A.   Ask the question again.
11   Q.   The question is, you understand that in
12 order to anticipate a claim, a particular device
13 has to satisfy every limitation of the claim,
14 correct?
15   MR. NARAYEN: Objection, asked and
16 answered, calls for a legal conclusion.
17   A.   That is -- that's my understanding.
18 BY MR. SEEVE:
19   Q.   Okay. Can you identify any device that
20 you or Pavle Belanovic or any of your graduate
21 students made using the VFLOAT library that
22 anticipates either of the claims asserted in this
23 case?
24   MR. NARAYEN: Objection, vague,
25 mischaracterizes the witness' report. The report

Page 45

1 speaks for itself.
2   A.   I would analyze how the design
3 addresses each of the claims in my report.
4 BY MR. SEEVE:
5   Q.   And what design are you referring to?
6   MR. NARAYEN: Objection, asked and
7 answered, vague.
8   A.   Can you ask the question again?
9 BY MR. SEEVE:
10   Q.   You said, I would analyze how the
11 design addresses each of the claims in my report,
12 and I -- my question was, what design are you
13 referring to?
14   MR. NARAYEN: Same objection.
15   A.   I'm just going to stand by the analysis
16 in the report about how the -- about the claims and
17 how VFLOAT anticipates the claims.
18 BY MR. SEEVE:
19   Q.   So you cannot, as you sit here now,
20 identify any particular design that you think
21 satisfies -- excuse me, start again.
22   As you sit here right now, you cannot
23 identify any particular circuit made using the
24 VFLOAT library that you believe anticipates any of
25 the asserted claims, is that correct?

Page 46

1   MR. NARAYEN: Objection.
2 Mischaracterizes the witness' prior testimony,
3 mischaracterizes the witness' report. The report
4 speaks for itself.
5   A.   You just said any of the asserted
6 claims, and I step through it in my report how
7 designs implemented with the VFLOAT library
8 anticipate the -- the claims.
9 BY MR. SEEVE:
10   Q.   So I understand that your report goes
11 limitation by limitation through the asserted
12 claims, and that in each section you make
13 reference to various circuits, some of which you
14 claim meet that limitation, and some of which you
15 just mention.
16   But as you've said, in order to
17 anticipate a claim, there has to be a single one
18 of them that satisfies every single one of the
19 requirements. Can you identify any such circuit
20 as you sit here today?
21   MR. NARAYEN: Objection, vague,
22 compound, mischaracterizes the witness' report,
23 the report speaks for itself.
24   A.   I'll stick with I stand by my report.
25 BY MR. SEEVE:

Page 47

1   Q.   So, Doctor Leeser, I'm asking you a
2 question about what you know right now and can
3 say. Saying that something is disclosed in your
4 report does not -- does not answer that question.
5   If you can't answer a question right
6 now about what you can identify right now as a
7 device that anticipates the claims, that is the
8 answer to my question. The answer would be no.
9   So I'm going to ask you again, can you
10 identify any single circuit that you built using
11 the VFLOAT library and implemented on an FPGA that
12 anticipates the claims?
13   MR. NARAYEN: Objection, asked and
14 answered, argumentative, mischaracterizes the
15 witness' report.
16   A.   So I believe that there are several
17 designs that meet every single one of the
18 limitations, but I am not prepared right now to
19 identify one that does that without further
20 analysis.
21 BY MR. SEEVE:
22   Q.   So you haven't analyzed whether or not
23 these designs actually anticipate the claims;
24 you're saying that further analysis would be
25 required before you could make that determination,

Page 48

1 is that correct?
2   A.   No, that is not correct. I said that I
3 would -- before committing that there is one
4 particular design that anticipates each and every
5 one of the limitations I'd like to do further
6 analysis. So I lay out in the report exactly how
7 the designs anticipate the claims in the patent.
8   Q.   Okay. So let me point you to page 95
9 of your report, paragraph 239.
10   A.   Okay.
11   Q.   Are you there?
12   A.   Yes.
13   Q.   You see how it says, Even if our system
14 containing 61 C2 multipliers is considered or
15 deemed not to anticipate the claim, do you see
16 that sentence?
17   A.   Uh-hum.
18   Q.   Is it fair to say that your report
19 argues that that system does anticipate the claim?
20 That is your argument, correct?
21   A.   So the claim that's being discussed
22 there is, I believe, the claim -- I'm not sure,
23 actually.
24   Not to anticipate the claim with
25 respect to this limitation. I'm not actually sure

Page 49

1   which limitation I'm referring to there. I believe
2   it's the limitation, let me check, on page 83 which
3   refers to the number of execution units. On page
4   83.
5   Q.   All right. So what you're telling me
6   is that you're not prepared to tell me which
7   circuits designed using VFLOAT, if any, meet all
8   of the claim requirements of the asserted claims,
9   correct?
10   MR. NARAYEN: Objection, asked and
11   answered, mischaracterizes the witness' prior
12   testimony.
13   A.   So I laid out in my report how designs
14   designed with the VFLOAT library anticipate the
15   claims, and I would like to further analyze one
16   particular design against all the claims, but I lay
17   out in the report, the paragraph you referred to,
18   paragraph 239, refers particularly to the
19   limitation regarding the number of LPHDR execution
20   units in the device.
21   BY MR. SEEVE:
22   Q.   All right, okay. So let me go through
23   that, because I think -- so you said you laid out
24   in your report how designs anticipate the claims.
25   You said you'd like to analyze further one

Page 50

1   particular design against all of the claims.
2   Is it fair to interpret that to say
3   that you talked about how various designs meet
4   individual limitations of the claim, but you
5   analyzed one design that meets all of them,
6   correct?
7   MR. NARAYEN: Objection, compound,
8   mischaracterizes the witness' testimony. Brian, I
9   didn't even understand that question.
10   MR. SEEVE: That is not really the
11   standard, Vishesh.
12   MR. NARAYEN: It didn't make
13   grammatical sense, I couldn't follow. If you
14   wouldn't mind reasking it.
15   MR. SEEVE: So the witness said I laid
16   out in my report how designs designed with the
17   VFLOAT library anticipate the claims, and I would
18   like to further analyze one particular design
19   against all of the claims. I'm just trying to
20   clarify what that means.
21   BY MR. SEEVE:
22   Q.   What did you mean when you said that?
23   A.   So the report lays out design --
24   circuits designed with a VFLOAT library how they
25   anticipate the claims in the patent.

Page 51

1   And the particular paragraph you asked
2   me to look at particularly refers to the number of
3   units. I would like to analyze one particular
4   design, the 61 C2 multipliers, take that one,
5   against all of the claim before I go on record
6   saying that that one design addresses all of the
7   limitations.
8   Q.   So as you sit here now without
9   referencing your report further, you don't know
10   whether that design with 61 C2 multipliers
11   satisfies all of the requirements of the claim,
12   you can only speak as to this one requirement that
13   you're looking at right now?
14   MR. NARAYEN: Objection,
15   mischaracterizes the witness' testimony and her
16   report.
17   A.   So I would like to further analyze one
18   particular design against all the limitations
19   before stating that that particular design
20   anticipates all of the limitations. I believe
21   that --
22   BY MR. SEEVE:
23   Q.   When you say -- I'm sorry, I have a
24   question about what you mean when you say analyze.
25   Do you mean that you would need to perform further

Page 52

1   analysis to determine whether or not that
2   particular design meets the requirements of the
3   claim?
4   MR. NARAYEN: Objection, vague.
5   A.   I would like to sit down with every
6   particular limitation and confirm that, in fact,
7   this one design does meet every single limitation
8   before I unequivocally state that this one design
9   anticipates every limitation.
10   BY MR. SEEVE:
11   Q.   So you're saying that at present
12   without, I guess, analysis that you have not yet
13   done, you cannot say whether this design with 61
14   C2 multipliers anticipates the claim?
15   MR. NARAYEN: Objection, vague,
16   mischaracterizes the witness' prior testimony,
17   asked and answered.
18   A.   My belief is that this one design
19   probably does meet the limitations, but I'm not
20   prepared to go on record stating that without
21   further checking each of the limitations. So I
22   believe that it does, but it requires further
23   analysis.
24   BY MR. SEEVE:
25   Q.   Okay. So you believe it probably

MIRIAM LEESER PHD   March 08, 2023
SINGULAR COMPUTING vs GOOGLE   53–56

Page 53
1   anticipates the claim, that's -- that's your
2   testimony?
3   A.   Yes.
4   Q.   Okay. So let's talk a little bit about
5   that system, that C2 system with the 61
6   multipliers on it. And you're not sure whether
7   that system anticipates the claim, but I'm going
8   to ask you some questions about it anyway. Is
9   that okay?
10   MR. NARAYEN: Objection, compound.
11 Mischaracterizes the witness' prior testimony.
12   A.   I believe that that system does
13 anticipate all the limitations. I'd like to do
14 further analysis before I unequivocally state that,
15 and I'm happy to answer more questions about that
16 particular system.
17 BY MR. SEEVE:
18   Q.   I think you said you believe the system
19 probably anticipates though, wasn't that your
20 testimony?
21   MR. NARAYEN: Objection,
22 mischaracterizes the witness' prior testimony.
23 Asked and answered.
24   MR. SEEVE: It doesn't mischaracterize
25 the witness' testimony. It's a direct quote from

Page 54
1   the witness' prior testimony, Vishesh. If you
2   could keep those objections to where they're
3   appropriate, I think we'll all get through this
4   faster. Let me reask that question.
5   BY MR. SEEVE:
6   Q.   So I believe your testimony,
7   Doctor Leeser, was that you think the C2 system
8   with the 61 multipliers probably anticipates the
9   claim, right? Is that correct?
10   MR. NARAYEN: Same objections.
11   A.   I believe the system with the 61
12 multipliers anticipates all of the claim
13 limitations, but I would like to analyze further
14 before I go on the record stating that that is the
15 case.
16 BY MR. SEEVE:
17   Q.   Okay. So now I'm going to ask you a
18 few questions about that system that you believe
19 might anticipate the claim. Is that okay?
20   A.   Yes.
21   Q.   Now, you say in your report that
22 this -- and just for the -- the 61 C2 multiplier
23 system was performed as a test to validate your
24 work, is that right?
25   A.   The 61 C2 multipliers was downloaded on

Page 55
1   the FPGA and tested as part of the research that
2   Pavle Belanovic did for his thesis.
3   Q.   And it was part of an experiment to
4   show how many of a given module could fit on an
5   FPGA, is that right?
6   A.   So it was one of the designs that we
7   downloaded on to the FPGA. Yes, we were looking at
8   how many designs could fit on to an FPGA.
9   Q.   Okay. So from now on, just because
10 saying 62 C2 multipliers system is cumbersome, I'm
11 going to refer to that as the C2 multiplier test
12 system.
13   Okay, so when I say C2 multiplier test
14 system, I am referring to the system described in
15 your report created by you and Pavle Belanovic in
16 which you placed 61 C2 multipliers on an FPGA
17 using a WILDSTAR connected to a host workstation.
18 Is that fair?
19   A.   Yes.
20   Q.   Okay.
21   A.   It is 61 multipliers. You keep saying
22 62, but it's 61.
23   Q.   I'm sorry, it's just C2 and 61, I get
24 confused sometimes. Maybe I'll just restate that
25 just so we're absolutely clear.

Page 56
1   MR. NARAYEN: Counsel, it sounds like
2   you're moving on to another topic.
3   MR. SEEVE: Not really.
4   MR. NARAYEN: Time for a break?
5   MR. SEEVE: I mean, if the witness
6   wants to take a break, that's fine, but, I mean we
7   can -- we can break or not.
8   MR. NARAYEN: Doctor Leeser said a few
9   more minutes is fine.
10   MR. SEEVE: And, Doctor Leeser, when
11 you want to take a break just say so, and we will.
12   THE WITNESS: We can keep going.
13   MR. SEEVE: So I'm going to mark as an
14 exhibit the thesis of Pavle Belanovic as Exhibit 2
15 to this deposition. Give me a moment. And
16 momentarily it should show up in that folder. Let
17 me know when it does.
18 (Leeser Exhibit 2 was marked for identification.)
19   A.   I can see it.
20   MR. SEEVE: And I'd just like to
21 explain that this copy of Doctor Belanovic's
22 thesis is not the copy Google produced, because
23 the copy Google produced has all the images
24 backward for some reason, but it is the copy that
25 I downloaded from the Northeastern website that is